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DEPARTMENT OF THE INTERIOR

UNITED STATES BUREAU OF MINES
JOHN W. FINCH, DIRECTOR

INFORMATION CIRCULAR

A FEW OF THE OPPORTUNITIES FOR OBTAINING ACCIDENT-PREVENTION INFORMATION AVAILABLE TO MINE MANAGEMENT AND EMPLOYEES THROUGH THE UNITED STATES BUREAU OF MINES

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C. A. HERBERT

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A FEW OF THE OPPORTUNITIES FOR OBTAINING ACCIDENT-PREVENTION INFORMATION AVAILABLE TO MINE MANAGEMENT AND EMPLOYEES THROUGH THE UNITED STATES BUREAU OF MINES[1]

An Accident-Prevention Program

By C. A. Herbert[2]

INTRODUCTION

The accident-prevention program outlined in this paper is based on the premise that most mine accidents are preventable, and in nearly all cases they are due to careless and dangerous practices and conditions that, as a rule, detract from efficient operation of the mine and may well be eliminated. That this is not a mistaken premise has been amply proved at mines where accidents have been reduced materially, if not to the minimum.

No claim is made that this is the only satisfactory program or plan for reducing accidents; the claim is made, however, that it is a workable program and if properly and intelligently adopted in part or in entirety will give satisfactory results.

THE PROGRAM

1. A Study of Accident Records and Reports

Obviously, if accidents are to be prevented the cause and type of accident must be known in order that intelligent steps may be taken to prevent their recurrence. Therefore, preliminary to beginning a safety program in which the Bureau's assistance has been requested, a Bureau engineer first studies the accident records and reports, usually tabulating the accidents according to cause and occupation if this is not already being done by the operator. A study of these reports and tabulations shows how and where most of the accidents occur. The completeness of this picture depends on the type of report required by the company. Unfortunately the accident reports and records of many (probably of most) companies are very meager insofar as

1. The Bureau of Mines will welcome reprinting of this paper provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6838."
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concerns details of the actual cause of the accident. The cause of the injury (fall of rock, run over by cars, etc.) is given, but little or nothing is said regarding the contributing factors leading to the accident - absolutely necessary information if adequate, well-directed steps are to be taken to prevent similar accidents in the future.

2. Safety Inspection

After the accident reports have been reviewed and a more or less complete picture of the type of accidents and the classification of the labor experiencing the majority of the accidents has been obtained a safety inspection is made of the mine to gain first-hand information on operating conditions and practices. A study of the accident reports assists the Bureau engineer in making the inspection, as it gives him an idea of the hazards to be expected. The safety inspection includes numerous - one might almost say innumerable - features, among them a check on ventilation by taking air measurements and mine-air samples and a study of the coal-dust explosion hazard including the taking of dust samples.

A copy of the report of this inspection calling attention to any unsafe conditions or practices and making recommendations for their correction is sent to the operator if he desires this service.

3. Accident-Prevention Course for Officials

After completion of the mine inspection a series of meetings is held with the mine officials, usually once each week, and the cause and means of preventing the various types of mine accidents, such as those from falls of roof and coal, haulage accidents, and accidents from explosives and electricity are discussed. The average mine official is concerned primarily with getting the maximum production possible per man and machine and as a rule gives relatively little personal thought to the question of safety, although the coal company may have instituted some sort of safety organization or even may have employed a safety man. The various facts brought out in this series of meetings emphasize the responsibility of the mine officials as regards accidents and usually reveal many dangerous conditions and practices that have been permitted, practically all of which are not necessary to obtain maximum production at the least cost.

Changes in practice that will promote greater safety are generally pointed out, and many of them are put into effect as the meetings proceed; as a rule, the accident record is noticeably improved by the time the course is finished. In substance, a set of much safer operating rules or standards covering the various phases of mine operation is developed, and many of these, if not all, are put into practice by the officials.

Any safety program is necessarily educational. Men must be educated and trained to do their work in a safe way, which after all is the best and most efficient way, and the mine officials in daily contact with the men must assume the responsibility for their education and training. However, before they can hope to sell the idea of safety to the men under their charge they must first have an adequate conception of the idea themselves.

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4. First-Aid Training

The Bureau of Mines has been training men in first aid for more than 20 years. At first this training was given solely by Bureau instructors to a limited number of employees at each mine. Later a new plan of first-aid training was inaugurated, by which a greater number of employees would receive the benefits of this training and a few capable not only of giving service in first aid but also of giving training in it would always be available at any mining plant. This plan provides enough additional training to certain selected employees to enable them to act as instructors under the supervision or guidance of Bureau of Mines instructors; it has operated very satisfactorily and makes possible the training of all the employees of even a large mine in a comparatively short time. Most of the Bureau's first-aid training throughout the United States is now given under this plan, and the result has been extremely gratifying. Where all or nearly all persons rather than a selected few at a mine or mining plant have taken first-aid training not only is qualified first-aid help virtually always present whenever an accident occurs but also those trained are usually safety conscious and take much greater precaution to avoid injury to themselves and to protect their fellow employees.

In addition, first-aid training not only teaches the men what to do in electric shock, arterial bleeding, or other severe injury, but it also plays an important part in any safety program. It makes each feel that he personally is taking an active part in the program; while taking the training he absorbs accident-prevention ideas and speculates on the needless occurrence of accidents as well as on available means of avoiding them. At the same time it puts him in a receptive frame of mind, making it much easier for the mine official to impress him with the thought that new safety rules that may be put into effect are for his own welfare or that of his fellow employees and should be obeyed.

First-aid training may be carried on at the same time or following the accident-prevention course to the officials.

5. Holmes Safety Chapters

To be successful any safety program must have the continued support and cooperation of the employees. It is believed that in most instances their support can best be won by the establishment and maintenance of a safety organization for employees which may meet monthly to discuss the accidents that have occurred during the month and suggest ways of preventing such accidents in the future. Entertainment of some sort or speakers may be provided for each meeting; at nearly every mine there usually is good musical or other talent that can be utilized. To encourage attendance, many operators furnish prizes such as safety shoes, safety hats, or clothing, which are drawn by lot or otherwise distributed.

Meetings of this type, at which the men and officials meet in a friendly and cooperative spirit, have done much to improve contract relations between the company and the local miners' organization.

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A chapter of the Holmes Safety Assoc. offers a workable set-up for such a safety organization. This association is sponsored by the United States Bureau of Mines and in some regions has the endorsement of the United Mine Workers of America. At present there are about 400 chapters of this organization in the mining fields of the United States with a membership of approximately 70,000.

These are but a few of the numerous activities of the United States Bureau of Mines available to the mining industry in its effort to aid in the reduction of the numerous hazards that confront those who work in mines. The Bureau has done and is doing many other types of work to aid in bringing about safety in mining. There is no question that mines need to be operated much more safely than they have been in the past and that with the right type of safety program they can be operated with reasonable freedom from injuries to workers.

Some Questions and Answers on Safety Effort in Mining

In a discussion with a mine operator in regard to starting a safety program at his operations certain questions usually arise; some of these are given here, together with a suitable reply.

Question: What will this safety program cost our company?

Answer: Very little money but much time, hard work, and hard thinking on the part of every official connected with the company. The results obtained will be essentially in direct proportion to the amount of sustained, intelligent effort expended; if a mine organization is not altogether convinced that such a program is worth while or if it is mentally or physically lazy it probably would be better not to attempt such a program, as the results undoubtedly would be disappointing.

Question: Will the men support such a program?

Answer: Yes, if the mining company's officials are in earnest and show the employees that they are sincere and are not inclined to "pass the buck" to the men; safety in mining requires cooperative effort, with no holding back by either employer or employee.

Question: Has a similar safety program been tried anywhere, and what has been the result?

Answer: Many operating companies in the various mining States have put this or a similar program into effect either in part or in entirety, and almost invariably the results have been satisfactory. No attempt will be made to give detailed results obtained by these many companies, but instead one company (Knox Consolidated Coal Co., Bicknell, Ind.) near the writer's headquarters will be cited as an example. This particular company was chosen because, prior to beginning its safety campaign, it had a very unfavorable safety record; the results obtained are therefore much more striking than if it

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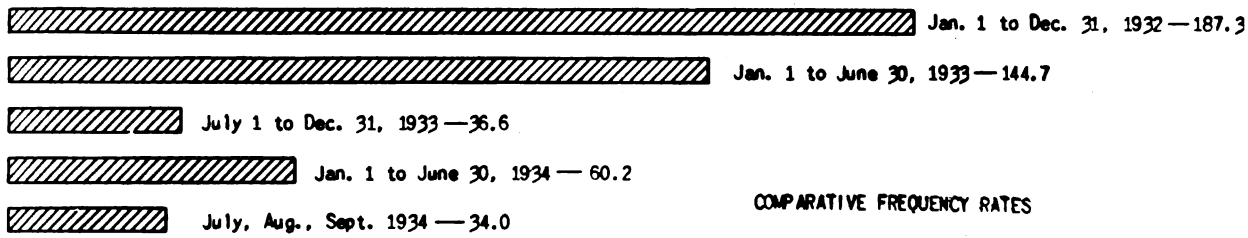

Jan. 1 to Dec. 31, 1932 — 187.3
Jan. 1 to June 30, 1933 — 144.7
July 1 to Dec. 31, 1933 — 36.6
Jan. 1 to June 30, 1934 — 60.2
July, Aug., Sept. 1934 — 34.0
COMPARATIVE FREQUENCY RATES

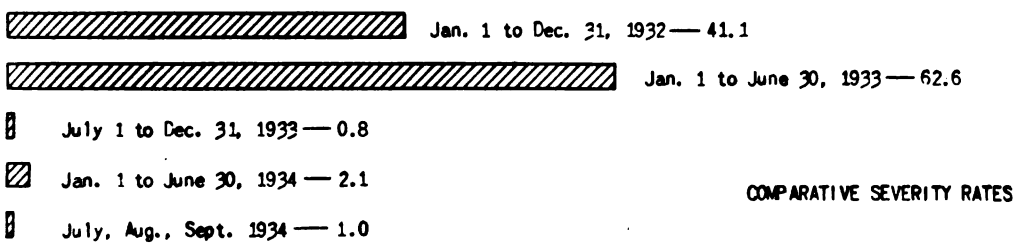
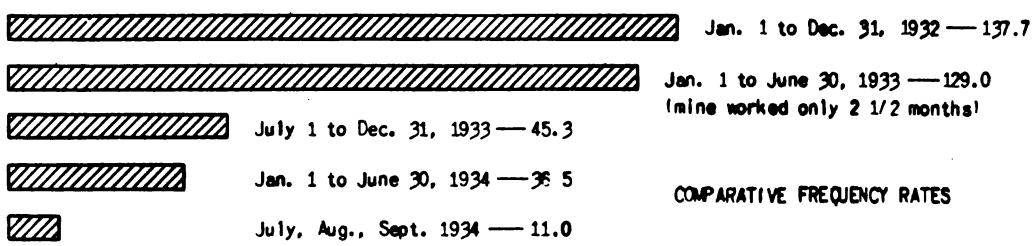

Jan. 1 to Dec. 31, 1932 — 41.1
Jan. 1 to June 30, 1933 — 62.6
July 1 to Dec. 31, 1933 — 0.8
Jan. 1 to June 30, 1934 — 2.1
July, Aug., Sept. 1934 — 1.0
COMPARATIVE SEVERITY RATES

Figure 1.- Frequency and severity rates, Knox Consolidated Coal Co., No. 1 mine, Bicknell, Ind.


Jan. 1 to Dec. 31, 1932 — 137.7
Jan. 1 to June 30, 1933 — 129.0
(mine worked only 2 1/2 months)
July 1 to Dec. 31, 1933 — 45.3
Jan. 1 to June 30, 1934 — 36.5
July, Aug., Sept. 1934 — 11.0
COMPARATIVE FREQUENCY RATES

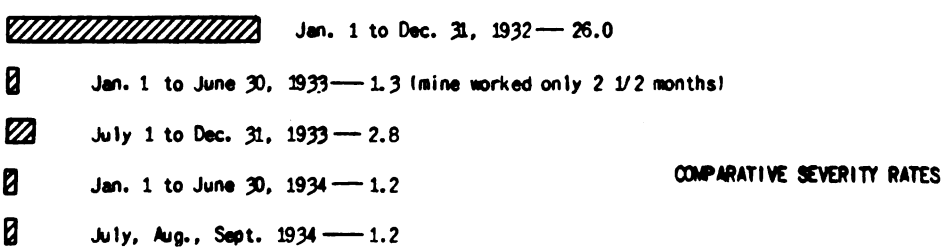

Jan. 1 to Dec. 31, 1932 — 26.0
Jan. 1 to June 30, 1933 — 1.3 (mine worked only 2 1/2 months)
July 1 to Dec. 31, 1933 — 2.8
Jan. 1 to June 30, 1934 — 1.2
July, Aug., Sept. 1934 — 1.2
COMPARATIVE SEVERITY RATES

Figure 2.- Frequency and severity rates, Knox Consolidated Coal Co., No. 2 mine, Bicknell, Ind.

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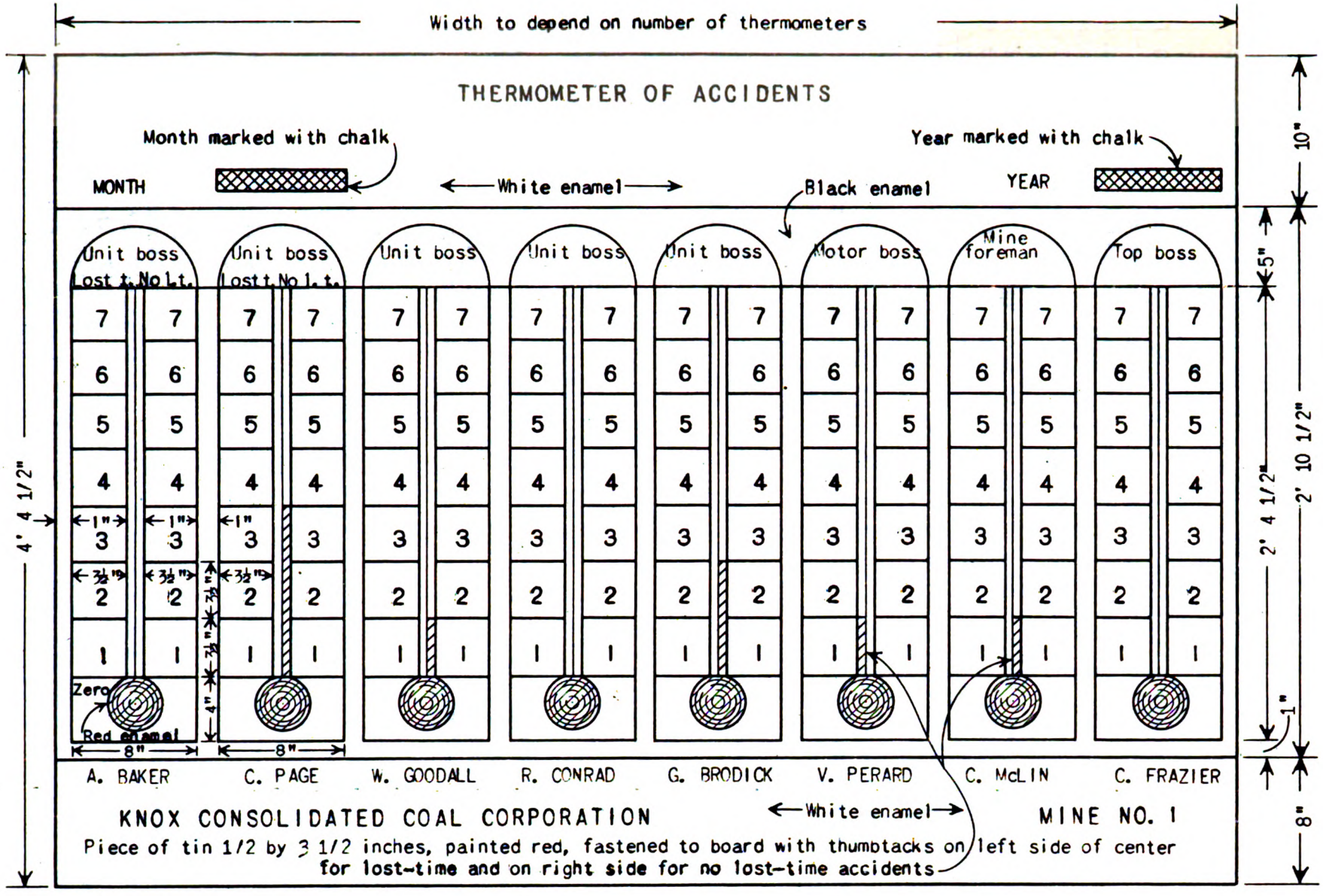

Figure 3.- Thermometer board, No. 1 mine, Knox Consolidated Coal Corporation.

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had had a fairly good record at the beginning. Moreover, this company put the entire program as outlined in this paper into effect.

In spite of the fact that for years the mines of the Knox Consolidated Coal Co. were recognized as examples of well-operated and well-managed mines, their accident rates were decidedly unfavorable, particularly during 1932. Because of the 1932 record and the record for the early part of 1933 the management took decisive steps to improve accident rates. The results of its efforts are clearly depicted in figures 1 and 2.

The accident-frequency rate at No. 1 mine was reduced from 187.3 for 1932 to an average of 43.6 for the 15-month period July 1, 1933, to September 30, 1934; the accident-severity rate for this mine was reduced from 41.1 for 1932 and 62.6 for the first half of 1933 to an average of 1.3 for the same 15-month period.

At No. 2 mine the frequency rate was reduced from 137.7 for 1932 to an average of 30.9 for the 15-month period July 1, 1933, to September 30, 1934; the severity rate at this mine was reduced from 26.0 for 1932 to an average of 1.7 for the same 15-month period.

The accident-frequency rate is the number of lost-time accidents per million man-hours of exposure.

The accident-severity rate is the number of days lost as a result of accidents per thousand man-hours of exposure.

A lost-time accident is one in which the injured person is unable to report for work on the day following the injury.

In computing the severity rate a fatality or permanent total disability was given the standard valuation of 6,000 days, whereas in all other lost-time accidents the full number of days of disability was assessed against the mine, irrespective of the number of days the mine may have worked during the disability period.

The reduction in severity rates at these two mines is a good indication of the reduction in compensation costs; it is doubtful whether the equivalent amount of effort on the part of the officials toward reduction of operating costs in these or other well-operated mines or in any other phase of mine operation could have equaled the savings effected through their safety work. In addition, there is the great satisfaction of having prevented loss of life and crippling of workmen.

One of the interesting phases of the safety campaign of this company is the use of a "Thermometer of Accidents" on which is shown monthly the individual records of the bosses or foremen. Figure 3 is a sketch of this "thermometer" board. This maintains a spirit of rivalry which stimulates efforts to hold accidents to the minimum. The company also has a flagpole at both of its mines, and the mine having the lowest accident rate for the month is privileged to fly the flag during the succeeding month.

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The following is quoted from the closing paragraphs of a paper entitled "Can Coal-Mine Accidents Be Prevented" delivered by P. G. Conrad, superintendent of the Knox Consolidated Coal Co., before the Indiana Coal Mining Institute in June 1934:

> Since this campaign our mines are in better physical condition than ever before in our mining experience. We find that what we have done, in making our mines a safer place to work for our employees, has not increased our cost a fraction of a cent per ton. On the contrary, we have found that it lowers the cost, due to increased efficiency and better cooperation of our employees, to say nothing of the greatest saving of all - that of human life and limb. As a result of our efforts and the cooperation of our employees we have reduced the accident-frequency and severity rates at our mines more than 75 percent.
>
> I am sure that anything that we have done, you can also do. From the results and experience of this campaign, I can say without hesitancy, accidents in coal mines can be prevented.

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